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STATUS REVIEW OF *Botrychium minganense*

U.S.D.A. FOREST SERVICE - REGION 1

LOLO NATIONAL FOREST

prepared by

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SUMMARY

Botrychium minganense is a small fern that occurs widely in northern North America extending south into Montana and other western states. Species in this genus are often hard to distinguish and the taxonomy is currently in flux. In Montana, it is currently known from seven locations. Two are in Glacier National Park in the Logan Pass area, one near Mount Aeneas in the Swan Range, two at Swan Lake, and two in the Ninemile Creek valley northwest of Missoula. Field surveys in July and August of 1991 located one additional population which is one of the two populations in the Ninemile area. Botrychium minganense has recently been added to the list of sensitive species for Region 1 of the U.S. Forest Service but has no status under the Endangered Species Act. It is classified as an S1 species (critically imperiled because of rarity) by the Montana Natural Heritage Program.

Botrychium minganense is reported from a wide variety of habitats ranging from low elevation meadows, riverbanks, sand dunes and woods to high elevation alpine meadows. In Montana, it occurs in low elevation, moist forests as well as alpine areas. In Ninemile Creek valley of the Lolo National Forest, it occurs in deeply-shaded creek bottoms in moist to wet Thuja plicata/ Oplopanax horridum and Thuja plicata/Clintonia uniflora habitat types. These sites are close to stream channels and are likely affected by periodic flooding.

Population size of Botrychium minganense is generally small and varies from year to year. The plants reproduce both sexually by spores and vegetatively by gemmae, and contain mycorrhizal fungi.

Timber harvest and grazing are potential threats to these plants. Management planning should take all Montana populations into account in order to maintain viable populations on U.S. Forest Service lands. Field surveys should be continued in areas of suitable habitat and monitoring of existing populations should be established.

I. SPECIES INFORMATION

A. CLASSIFICATION

1. **SCIENTIFIC NAME:** Botrychium minganense Victorin

2. **COMMON NAME:** Mingan Island Moonwort

3. **FAMILY:** Ophioglossaceae (Adder's-tongue Family)

4. **GENUS:** The genus Botrychium contains about 50 species worldwide, perhaps 25 of which occur in North America (Cody and Britton 1989, Lellinger 1985). Botrychium consists of three subgenera, with the subgenus Botrychium (Moonworts) containing B. minganense. The species of Botrychium are often hard to distinguish since the plants vary greatly according to habitat conditions and maturity. Species have been often confused in floras and herbaria. The plants are difficult to work with both experimentally and in natural populations.

   Recent work by W.H. Wagner (e.g. Wagner and Lord 1956, Wagner and Wagner 1983a,b; 1990) has resulted in many new species being described. Wagner's approach differs from the more classical approach of Clausen's monograph (Clausen 1938) in that Wagner has emphasized the species level without recognizing subspecific levels and has developed the concept of "genus communities" (Wagner and Wagner 1983a) in which several species occur together at one locality. The ultimate usefulness of this approach, which seems to emphasize differences rather than similarities, is a matter of active debate in the scientific community.

5. **SPECIES:** Botrychium minganense occurs widely in North America although it is nowhere common. It was first described as a species in 1927 (Victorin 1927) and was generally considered a variety of B. lunaria until Wagner and Lord (1956) showed the distinctness of the two species. Botrychium lunaria is a diploid (n=45) whereas Botrychium minganense is a tetraploid (n=90) (Love and Love 1976, Wagner and Lord 1956).

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. **FEDERAL STATUS:** Botrychium minganense has recently been added to the list of sensitive species for

Region 1 of the U.S. Forest Service. It has no status under the Endangered Species Act.

2. **STATE:** Botrychium minganense has most recently been ranked by the Montana Natural Heritage Program (Achuff 1991) as an S1 species ("critically imperiled in Montana because of rarity (5 or fewer occurrences)") and is considered "sensitive" within the state (Lesica and Shelly 1991). It is also ranked S1 in Idaho where it is currently known from five locations in northern Idaho (Lorain 1990, Moseley and Groves 1990).

C. DESCRIPTION

1. **GENERAL NON-TECHNICAL DESCRIPTION:** Botrychium minganense is a small, herbaceous, somewhat fleshy perennial fern usually 2.5-7 inches tall although occasionally up to 12 inches tall (Fig. 1). The plants consist a single stem, 1.5-4 inches tall, that bears two "leaves," one sterile and one fertile. The sterile portion is attached to the main stem by a short (up to 0.2 inch) stalk and is divided into numerous, wedge-shaped segments (pinnae) that do not overlap or touch. The pinnae are 0.2-0.3 inches wide, commonly cupped or spoon-shaped rather than flat and frequently have shallowly incised edges. The fertile portion is 0.5-6 inches long, paniculate, and bears rounded sporangia along the margins.

2. **TECHNICAL DESCRIPTION:** Stems from a short erect rhizome, producing one frond per season; fronds mostly 6-18 (30) cm long; sterile and fertile portions erect and equal in the hairless bud; fertile portion 1.5-10 cm long, paniculate; sterile portion 1.5-10 cm long on a short, $\leq$5 mm long stalk, oblong, 0.5-2.5 cm wide, truncate at the base and rounded at the apex, with (2) 3-6 (7) pairs of pinnae; pinnae 4-7 mm wide, subflabellate, cupped or spatulate rather than flat, the margins entire but frequently shallowly incised, not overlapping or touching (adapted from Cody and Britton 1989, Kuijt 1982, Lellinger 1985, Taylor 1973, Wagner and Lord 1956).

3. **LOCAL FIELD CHARACTERS:** Botrychium minganense can be confused with the more common B. lunaria. But in Botrychium minganense the pinnae are 4-7 mm wide, broadly cuneate and not overlapping or

Figure 1. Habit of Botrychium minganense.

touching versus, in B. lunaria, the pinnae 10-12 mm wide, fan-shaped to semicircular and overlapping or nearly so.

D. GEOGRAPHICAL DISTRIBUTION

1. **RANGE:** Botrychium minganense occurs widely in North America from Labrador to British Columbia and Alaska, and south to New York, Michigan, Wisconsin, North Dakota, Montana, Idaho, Utah, Nevada, Oregon and California (Cody and Britton 1989, Lellinger 1985).

2. **CURRENT SITES:** Botrychium minganense is currently known from seven locations in Montana. Two are in Glacier National Park in the Logan Pass area (element occurrences 004, 005), one near Mount Aeneas in the Swan Range (001), two at Swan Lake (002, 003), and two in the Ninemile Creek valley northwest of Missoula (006, 007). The Swan Lake sites are on private land. The Glacier National Park sites are on land managed by the National Park Service, and the other sites are on U.S. Forest Service land. One of the sites in the Ninemile Valley (007 - Little Marion Creek) was newly located during surveys in July 1991.

3. **HISTORICAL SITES:** None.

4. **UNVERIFIED/UNDOCUMENTED SITES:** None.

5. **AREAS SURVEYED BUT SPECIES NOT LOCATED:** Portions of the following areas in Ninemile Valley were searched unsuccessfully for Botrychium minganense in 1991:

T16N R23W S01 SW¼
T16N R23W S04 W½
T16N R23W S05 W½, SE¼
T16N R23W S06 N½
T16N R23W S09 NW¼
T16N R23W S10 E½
T16N R23W S11
T16N R23W S12 NW¼
T16N R23W S13 S½, NE¼
T16N R23W S14 SE¼
T16N R23W S15
T16N R23W S17 SW¼
T16N R23W S18 SE¼
T16N R23W S19 NW¼
T16N R23W S20 N½
T16N R23W S22 SE¼
T16N R23W S23 NW¼

T16N R24W S11 S½
T16N R24W S12 SW¼
T16N R24W S13 E½

T17N R23W S19 SW¼
T17N R23W S28 SE¼
T17N R23W S29
T17N R23W S30
T17N R23W S31 NW¼
T17N R23W S32 W½
T17N R23W S33 N½, SE¼
T17N R23W S34 SW¼

T17N R24W S14 SE¼
T17N R24W S24 S½, NW¼
T17N R24W S25 W½, NE¼
T17N R24W S26 NE¼
T17N R24W S36 NW¼

E. **HABITAT:** Botrychium minganense is reported from a wide variety of habitats in North America ranging from low elevation meadows, riverbanks, sand dunes and woods to high elevation alpine meadows (Cody and Britton 1989, Lellinger 1985).

In Montana, Botrychium minganense occurs in low elevation, moist forests as well as alpine areas with an elevational range of 945-2035 m (3100-6680'). Detailed habitat information is available only for the sites in Ninemile Creek valley (006 and 007). In these locations, Botrychium minganense occurs in deeply-shaded creek bottoms in moist to wet Thuja plicata/Oplopanax horridum and Thuja plicata/Clintonia uniflora habitat types. This is similar to the habitat described for some of the Idaho occurrences (Lorain 1990) although other occurrences there are in habitats such as a disturbed Pinus contorta/Vaccinium globulare forest and a regenerating forest of small Pseudotsuga menziesii and Abies lasiocarpa with a dense, shrubby understory that had been logged and burned 30 years previously.

1. **ASSOCIATED VEGETATION:** Botrychium minganense populations in Montana typically occur in mesic Thuja plicata-Tsuga heterophylla forests. Other associated plant species include:

Abies grandis (grand fir)
Picea engelmannii (Engelmann spruce)
Oplopanax horridum (devil's club)
Rubus parviflorus (thimbleberry)
Actaea rubra (baneberry)

Adenocaulon bicolor (trail plant)
Athyrium filix-femina (lady fern)
Botrychium virginianum (rattlesnake fern)
Chimaphila umbellata (pipsissewa)
Clintonia uniflora (Queen's cup)
Disporum trachycarpum (fairy bell)
Gymnocarpium dryopteris (oak fern)
Listera convallarioides (broad-leaved twayblade)
Lycopodium complanatum (ground cedar)
Moneses uniflora (one-flowered wintergreen)
Orchis rotundifolia (round-leaved orchis)
Pyrola chlorantha (green-flowered wintergreen)
Smilacina racemosa (false Solomon's seal)
Tiarella trifoliata (false mitrewort)
Mnium spp. (moss)

2. **TOPOGRAPHY:** Botrychium minganense in the Ninemile Valley sites occurs in moist creek bottoms in microsites that are close to stream channels, especially in small, seasonally-flooded channels and just below the high water mark. Topographic preferences appear to differ at higher elevations and in other geographic areas. However, there may to be a common requirement for a moist microsite.

3. **SOIL RELATIONSHIPS:** Soil reaction preferences are not clear, with Lellinger (1985) mentioning "acid to circumneutral soil" while Cody and Britton (1989) cite "marly meadows" which are quite alkaline. The plants in the Ninemile Valley sites occurred mostly on organic matter, either needle litter of Thuja plicata or well rotted logs.

4. **REGIONAL CLIMATE:** The regional climate of western Montana is characterized by warm summers and cold, snowy winters. Precipitation in western Montana is generally well distributed with peaks in December and January, mostly as snow, and in May and June, mostly as rain (U.S. Department of Commerce 1982).

Relevant climatic data are available only for the lower elevation occurrences in Ninemile Creek valley and near Swan Lake. The climatic station closest to the Ninemile Creek sites is at Superior which is about 25 miles northwest and, at 2710' (825 m), about 400' (120 m) lower in altitude. The climatic station closest to the Swan Lake sites is at Big Fork which is about 5 miles to the northwest and, at 3010' (920 m), about 100' (30 m) lower than the sites. For the period 1951-1980 (U.S. Department of Commerce 1982), the January mean temperature at Superior was 25.4°F (-3.7°C)

and at Big Fork was 25.8°F (-3.4°C). The July mean temperature was 67.5°F (19.7°C) at Superior and 66.5°F (19.2°C) at Big Fork. The annual mean temperature was 46.3°F (7.9°C) at Superior and 45.5°F (7.5°C) at Big Fork.

The mean annual precipitation at Superior was 17.46" (443.5 mm) and at Big Fork was 22.08" (8.69). At Superior, December (1.80") (45.7 mm) and January (2.17") (55.1 mm) are wettest with June (1.80") (45.7 mm) and July (1.86") (46.5 mm) slightly drier. At Big Fork, May (2.38") (60.5 mm) and June (2.98") (75.7 mm) are the wettest months with December (2.15") (54.6 mm) and January (2.20") (55.9 mm) forming the second precipitation peak. July is the driest month at both locations (Superior - 0.85" (21.6 mm), Big Fork - 1.32" (33.5 mm)).

Temperatures at the higher elevation sites in Montana are undoubtedly cooler than Superior and Big Fork but are probably as moist.

F. POPULATION DEMOGRAPHY AND BIOLOGY

1. **PHENOLOGY:** In Montana, plants generally develop mature spores in late July or August.

2. **POPULATION SIZE AND CONDITION:** Populations of Botrychium minganense are generally small and may vary markedly from year to year, perhaps being absent in some years (Wagner and Wagner 1990). Population sizes are generally a few 10's, although a population of ca. 150 has been observed. The Marion Creek population (006) contained at least 150 plants in 1990 but in 1991 only 25 plants were found. This may have been due to a cold, wet season. Details of population size and condition for each occurrence are in Section IV.

3. **REPRODUCTIVE BIOLOGY**

   a. **TYPE OF REPRODUCTION:** Botrychium minganense reproduces via spores that are produced in the marginal sporangia of the fertile frond. The spores germinate to form a small, inconspicuous gametophyte which produces gametes that unite to form an embryo which then grows into the more visible sporophyte described above.

Botrychium minganense also reproduces vegetatively by underground gemmae that are formed in stem tissue (Farrar and Johnson-Groh 1990). The gemmae are sporophytic tissue which may contain a mycorrhizal fungus. The gemmae develop into a mature sporophyte. This is an unusual method of reproduction in ferns and is currently known only from four species of Botrychium. Not all Botrychium minganense plants produce gemmae (Farrar and Johnson-Groh 1990) and it is not known if Montana plants do or not.

b. **SPORE DISPERSAL AND BIOLOGY:** The spores of Botrychium minganense are probably dispersed by wind currents but no information is available on the biology of spore germination or of the gametophyte.

G. POPULATION ECOLOGY

1. BIOLOGICAL INTERACTIONS

a. **COMPETITION:** No direct information is available on the competitive characteristics of Botrychium minganense. However, the plant appears to occupy shaded microsites within the wide range of habitats reported for it. Even in herbaceous meadows, given its short stature, it likely is well shaded. Thus, it appears tolerant of low light intensities.

b. **HERBIVORY:** No herbivory has been observed in Montana populations of Botrychium minganense.

c. **MUTUALISM:** Mycorrhizal fungi are apparently ubiquitous in both the sporophytes and gametophytes of most Botrychium species including Botrychium minganense (Berch and Kendrick 1982, Farrar and Johnson-Groh 1990, Lellinger 1985). Most species of this genus are notoriously difficult, if not impossible, to grow in cultivation and this may be related to the mycorrhizal relationship.

2. ABIOTIC INTERACTIONS

FLOOD: Botrychium minganense in the Ninemile Valley sites occurs in moist creek bottoms in microsites that are close to stream channels, especially in small, seasonally-flooded channels and just below the high water mark. These sites

are undoubtedly affected in years of higher flood levels and may be eroded away entirely as channels shift across a floodplain. Upland sites occupied by Botrychium minganense would not be subject to this disturbance.

H. LAND OWNERSHIP

Three of the seven occurrences of Botrychium minganense in Montana are on land managed by the U.S. Forest Service, two on the Lolo National Forest and one on the Flathead National Forest. Two occurrences are in Glacier National Park and the other two are on private land. Specific information for each occurrence is given below and exact locations are listed in Section IV.

1. **U.S.D.A. Forest Service**

   Flathead National Forest

   Hungry Horse Ranger District

   Mount Aeneas (001)

   Lolo National Forest

   Ninemile Ranger District

   Marion Creek (006)
   Little Marion Creek (007)

2. **U.S. National Park Service**

   Glacier National Park

   Ptarmigan Lake (004)
   Logan Pass (005)

3. **Private**

   Cedar Bay Road (002, 003)

II. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

A. THREATS TO CURRENTLY KNOWN POPULATIONS

1. **GRAZING:** In the habitats so far reported for Botrychium minganense in Montana, there appears to be little grazing use and no current damage is known from these sites. However, habitats reported

for it elsewhere include meadows and other situations where grazing would likely be a greater threat. Since the distribution of this plant is so poorly known, it may be found to occur in Montana in habitats that are subject to grazing pressure.

2. **TIMBER HARVEST:** Timber harvest is a potential threat to Botrychium minganense populations since the forests in which they occur are often considered mature or overmature for timber purposes. The microhabitats occupied by Botrychium minganense in Ninemile Creek valley are immediately adjacent to the stream and presumably watershed protection measures would prohibit harvest of trees close to the stream. However, harvesting of the adjacent area may cause changes in streamflow and flood patterns that could affect the populations as discussed above (sec. I.G.2). Such disturbance may also affect the mycorrhizal fungi which are necessary for growth and reproduction. Such combined effects likely would reduce the ability of these already sparse populations to maintain or re-establish themselves after harvesting.

B. **MANAGEMENT PRACTICES AND RESPONSE:** Nothing is known of the specific responses of Botrychium minganense to grazing or timber harvest. However, given its restriction to a fairly specialized habitat and obligate relationship with mycorrhizal fungi, it likely would not respond well to such practices.

C. **RECOMMENDATIONS FOR MAINTAINING VIABLE POPULATIONS:** The following recommendations are made to ensure that the long-term viability of Botrychium minganense populations is maintained on U.S. Forest Service land in Montana.

1. Protection of natural habitats that currently support Botrychium minganense populations. Management plans on the Lolo National Forest should take all known populations into consideration and prevent disturbance of the sites.

2. Notification of U.S. Forest Service personnel of sites on U.S. Forest Service lands. To prevent inadvertent impacts on currently known sites, personnel involved in planning activities should be provided with detailed information on the location of Botrychium minganense populations. It is especially important that timber sale managers,

engineers, and range conservationists at the Ranger District level know these locations so that disturbance can be prevented.

D. RECOMMENDATIONS FOR FURTHER ASSESSMENT

1. Further field surveys of potential habitats and known sites. Additional field surveys should be made in the Lolo National Forest in areas of moist Thuja plicata-Tsuga heterophylla forest. Because these plants may not appear every year and may be quite sensitive to varying climatic conditions (Wagner and Wagner 1990), areas of apparently suitable habitat that were searched without success in 1991 should be checked again. These include portions of Barette, Moncure and McCormick creeks.

2. Establishment of monitoring studies to assess population condition and status. Monitoring studies should be established to better determine population dynamics and the effects of any habitat alteration on Botrychium minganense. The methods outlined in Lesica (1987, Lesica and Ahlenslager 1991) are suitable for monitoring these populations and could be combined with other techniques such as ECODATA plots.

III. LITERATURE CITED

Achuff, P.L. 1991. Plant species of special concern. Montana Natural Heritage Program, Helena. 20 pp.

Berch, S.M. and B. Kendrick. 1982. Vesicular-arbuscular mycorrhizae of southern Ontario ferns and fern-allies. Mycologia 74: 769-776.

Clausen, R.T. 1938. A monograph of the Ophioglossaceae. Memoirs of the Torrey Botanical Club 19: 1-177.

Cody, W.J. and D.M. Britton. 1989. Ferns and fern allies of Canada. Agriculture Canada Research Branch Publication 1829: 430 pp.

Farrar, D.R. and C.L. Johnson-Groh. 1990. Subterranean sporophytic gemmae in moonwort ferns, Botrychium subgenus Botrychium. American Journal of Botany 77: 1168-1175.

Kuijt, J. 1982. A flora of Waterton Lakes National Park. University of Alberta Press, Edmonton. 684 pp.

Lellinger, D.B. 1985. A field manual of ferns and fern-allies of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 389 pp.

Lesica, P. 1987. A technique for monitoring nonrhizomatous perennial plant species in permanent belt transects. Natural Areas Journal 7: 65-68.

Lesica, P. and K. Ahlenslager. 1991. Demographic monitoring of three species of Botrychium (Ophioglossaceae) in Waterton Lakes National Park, Alberta: 1990 progress report. Division of Biological Science, University of Montana, Missoula. 13 pp.

Lesica, P. and J.S. Shelly. 1991. Sensitive, threatened and endangered vascular plants of Montana. Montana Natural Heritage Program, Occasional Publication 1: 88 pp.

Lorain, C.C. 1990. Field investigations of Botrychium subgenus Botrychium (moonworts) on the Idaho Panhandle National Forests. Conservation Data Center, Idaho Department of Fish and Game, Boise. 34 pp. + appendices.

Love, A. and D. Love. 1976. IOBP chromosome number reports LIII. Taxon 25: 483-500.

Moseley, R. and C. Groves. 1990. Rare, threatened and endangered plants and animals of Idaho. Conservation Data Center, Idaho Department of Fish and Game, Boise. 33 pp.

Taylor, T.M.C. 1973. The ferns and fern allies of British Columbia. British Columbia Provincial Museum Handbook 12: 172 pp.

U.S. Department of Commerce. 1982. Monthly normals of temperature, precipitation, and heating and cooling degree days 1951-1980, Montana. National Oceanic and Atmospheric Administration, Climatography of the United States No. 81: 23 pp.

Victorin, F.M. 1927. Sur un Botrychium nouveau de la flore Americaine et ses rapports avec le B. lunaria et le B. simplex. Trans. Royal Can. Inst. Ser. 3,21 (5): 319-340.

Wagner, W.H. and L.P. Lord. 1956. The morphological and cytological distinctness of Botrychium minganense and B. lunaria in Michigan. Bulletin of the Torrey Botanical Club 83: 261-280.

Wagner, W.H. and F.S. Wagner. 1983a. Genus communities as a systematic tool in the study of New World Botrychium (Ophioglossaceae). Taxon 32: 51-63.

Wagner, W.H. and F.S. Wagner. 1983b. Two Moonworts of the Rocky Mountains; Botrychium hesperium and a new species formerly confused with it. American Fern Journal 73: 53-62.

Wagner, W.H. and F.S. Wagner. 1990. Moonworts (Botrychium subg. Botrychium) of the upper Great Lakes region, U.S.A. and Canada, with descriptions of two new species. Contributions of the University of Michigan Herbarium 17: 313-325.

IV. ELEMENT OCCURRENCE PRINT-OUTS AND MAPS

Element Occurrence Record
Botrychium minganense

Occurrence number: 001

Global rank: G4 Forest Service status: SENSITIVE
State rank: S1 Federal Status:

Survey site name: MT. AENEAS
EO rank:
EO rank comments:

County: FLATHEAD

USGS quadrangle: JEWEL BASIN

Township: 028N Range: 018W Section: 30 Precision: G
Township-range comments:

Survey date: Elevation: 5400
First observation: 1976 Slope/aspect:
Last observation: 1976-08-14 Size (acres): 0

Location:
ON TRAIL # 8 OF MT. AENEAS (GENERAL LOCATION).

Element occurrence data:
UNKNOWN.

General site description:
UNKNOWN.

Land owner/manager:
FLATHEAD NATIONAL FOREST, SWAN LAKE RANGER DISTRICT

Comments:

Information source:
KOTENKO, J. (1). 1976. SPECIMEN # 103227. MONTU.

Element Occurrence Record
Botrychium minganense

Occurrence number: 002

Global rank: G4 Forest Service status: SENSITIVE
State rank: S1 Federal Status:

Survey site name: CEDAR BAY ROAD
EO rank:
EO rank comments:

County: LAKE

USGS quadrangle: CRATER LAKE

Township: 026N Range: 019W Section: 23 Precision: M
Township-range comments:

Survey date:
First observation: 1976
Last observation: 1976-07-29

Elevation: 3120
Slope/aspect:
Size (acres): 0

Location:
CEDAR BAY ROAD, NORTHWEST SIDE OF SWAN LAKE.

Element occurrence data:
UNKNOWN.

General site description:
UNKNOWN.

Land owner/manager:
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:
MAY BE PRIVATE OR CHAMPION OWNED.

Information source:
KOTENKO, J. (2). 1976. SPECIMEN # 10356. MONTU.

Element Occurrence Record
Botrychium minganense

Occurrence number: 003

Global rank: G4 Forest Service status: SENSITIVE
State rank: S1 Federal Status:

Survey site name: CEDAR BAY ROAD
EO rank:
EO rank comments:

County: LAKE

USGS quadrangle: CRATER LAKE

Township: 026N Range: 019W Section: 14 Precision: M
Township-range comments:

Survey date: Elevation: 3100
First observation: 1976 Slope/aspect:
Last observation: 1977-07-31 Size (acres): 0

Location:
WEST SIDE OF SWAN LAKE, ROAD TO CEDAR BAY, CA. 1.5 MILES FROM CEDAR BAY ROAD, WEST SIDE OF ROAD.

Element occurrence data:
"IN 1977 ONLY ONE RARE PLANT WHERE THERE WERE A SCORE THE YEAR BEFORE."

General site description:
IN SMALL RAVINE WITH MOIST WOODS; SOME DISTURBANCE, MANY HERBS; WITH BOTRYCHIUM DUSENII, DRYOPTERIS SPINOSA AND D. FELIX-MAS.

Land owner/manager:
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:
MAY BE ON FOREST PRODUCTS LAND. VOUCHER - MERHOFF, L.A. (7602), 1976, SPECIMEN # 80731 (MONTU).

Information source:
MERHOFF, L.A. (7703). 1977. SPECIMEN # 80729. MONTU.

Element Occurrence Record
Botrychium minganense

Occurrence number: 004

Global rank: G4 Forest Service status: SENSITIVE
State rank: S1 Federal Status:

Survey site name: PTARMIGAN LAKE
EO rank:
EO rank comments:

County: GLACIER

USGS quadrangle: MANY GLACIER

Township: 036N Range: 016W Section: 29 Precision: M
Township-range comments: SW4

Survey date:
First observation: 1933
Last observation: 1933-07-31

Elevation: 6500
Slope/aspect:
Size (acres): 0

Location:
NEAR OUTLET OF PTARMIGAN LAKE, NE OF LOGAN PASS.

Element occurrence data:
RARE.

General site description:
ON MOSSY BANKS.

Land owner/manager:
GLACIER NATIONAL PARK

Comments:
NONE.

Information source:
HITCHCOCK, C.L. (2052). 1933. SPECIMEN # 21312. MONT.

Element Occurrence Record
Botrychium minganense

Occurrence number: 005

Global rank: G4 Forest Service status: SENSITIVE
State rank: S1 Federal Status:

Survey site name: LOGAN PASS
EO rank:
EO rank comments:

County: FLATHEAD
GLACIER

USGS quadrangle: LOGAN PASS

Township: 034N Range: 016W Section: 16 Precision: M
Township-range comments: SW4

Survey date:
First observation: 1979
Last observation: 1979-08-11

Elevation: 6680
Slope/aspect:
Size (acres): 0

Location:
GLACIER NATIONAL PARK, LOGAN PASS.

Element occurrence data:
UNKNOWN.

General site description:
ROCKY ALPINE AREA.

Land owner/manager:
GLACIER NATIONAL PARK

Comments:
NONE.

Information source:
PREECE, S. (1419). 1979. SPECIMEN # 67839. MONTU.

Element Occurrence Record
Botrychium minganense

Occurrence number: 006

Global rank: G4 Forest Service status: SENSITIVE
State rank: S1 Federal Status:

Survey site name: MARION CREEK
EO rank:
EO rank comments:

County: MISSOULA

USGS quadrangle: STARK NORTH

Township: 017N Range: 023W Section: 33 Precision: S
Township-range comments: SW4SW4

Survey date: 1991-07-06 Elevation: 4000
First observation: 1990 Slope/aspect: 1-5% / SOUTHWEST
Last observation: 1991-07-06 Size (acres): 2

Location:
NINEMILE CREEK, CA. 25 MILES NORTHWEST OF MISSOULA. TURN OFF MAIN NINEMILE ROAD CA. 12 MILES NORTHWEST OF NINEMILE DISTRICT OFFICE ONTO PRIVATE ROAD UP MARION CREEK; FOLLOW UP CREEK 0.25-0.75 MILE.

Element occurrence data:
1991: 25 PLANTS ON 16 JULY. 1990: MORE THAN 150 PLANTS, SHEDDING SPORES ON 7 AUGUST.

General site description:
PLANTS IN CREEK BOTTOM IN MOIST TO WET SITES IN THUJA PLICATA/OPLOPANAX HORRIDUM AND THUJA PLICATA/CLINTONIA UNIFLORA HABITAT TYPES; PLANTS IN BOTH NEEDLE LITTER AND VEGETATED UNDERSTORIES. ASSOCIATED SPECIES: PICEA ENGELMANNII, ABIES GRANDIS, OPLOPANAX HORRIDUM, CLINTONIA UNIFLORA, BOTRYCHIUM VIRGINIANUM, TIARELLA TRIFOLIATA, FRAGARIA VESCA, DRYOPTERIS SPP.

Land owner/manager:
LOLO NATIONAL FOREST, NINEMILE RANGER DISTRICT

Comments:
1990 SURVEY CONDUCTED BY ANDREW KRATZ. VOUCHER - KRATZ, ANDREW. (900808001), 1990, MONTU, MRC.

Information source:
ACHUFF, P.L. 1991. [FIELD SURVEY OF NINEMILE VALLEY, MISSOULA COUNTY, 15-19 JULY AND 10-11 AUGUST (BOTRYCHIUM MINGANENSE, SATUREJA DOUGLASII)].

Element Occurrence Record
Botrychium minganense

Occurrence number: 007

Global rank: G4 Forest Service status: SENSITIVE
State rank: S1 Federal Status:

Survey site name: LITTLE MARION CREEK
EO rank: B
EO rank comments: SMALL POPULATION IN RESTRICTED HABITAT WITH MINING AND LOGGING IN VICINITY.

County: MISSOULA

USGS quadrangle: STARK NORTH

Township: 016N Range: 023W Section: 05 Precision: S
Township-range comments: NE4

Survey date: 1991-07-17 Elevation: 4040
First observation: 1991 Slope/aspect: 1-5% / SOUTHWEST
Last observation: 1991-07-17 Size (acres): 1

Location:
NINEMILE CREEK, CA. 25 MILES NORTHWEST OF MISSOULA. TURN OFF MAIN ROAD CA. 12 MILES NORTHWEST OF NINEMILE DISTRICT OFFICE ONTO PRIVATE ROAD UP MARION CREEK; FOLLOW TO LITTLE MARION CREEK CROSSING; POPULATION IS IMMEDIATELY DOWNSTREAM.

Element occurrence data:
20 PLANTS IN TWO SUBPOPULATIONS, MOST PLANTS IN EARLY DEVELOPMENTAL STAGE ON JULY 17, 1991.

General site description:
PLANTS IN MOIST STREAMSIDE, ON LITTER OR WELL-ROTTED LOGS IN DEEP SHADE OF THUJA PLICATA FOREST, ESPECIALLY IN SEASONALLY FLOODED SMALL CHANNELS AND JUST BELOW HIGH WATER MARK. ASSOCIATED SPECIES: GYMNOCARPIUM DRYOPTERIS, TIARELLA TRIFOLIATA, OPLOPANAX HORRIDUM, TAXUS BREVIFOLIA, MONESES UNIFLORA, LISTERA CONVALLARIOIDES, BOTRYCHIUM VIRGINIANUM, ABIES GRANDIS, CLINTONIA UNIFLORA.

Land owner/manager:
LOLO NATIONAL FOREST, NINEMILE RANGER DISTRICT

Comments:

Information source:
ACHUFF, P.L. 1991. [FIELD SURVEY OF NINEMILE VALLEY, MISSOULA COUNTY, JULY 15-19, AUGUST 10-11, (BOTRYCHIUM MINGANENSE, SATUREJA DOUGLASII)].

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